



Research Article

New Records of Subfamily Opiinae (Hymenoptera: Braconidae) from Khyber Pakhtunkhwa Province of Pakistan with Description of a New Species

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Abstract | Genus *Opiognathus*, of the subfamily Opiinae (Hymenoptera, Braconidae) is recorded for the first from Pakistan. A new species *Opiognathus nitidus* M. Sabahatullah & Shah sp.nov. is described and illustrated. Five species of the subfamily Opiinae are reported for the first time from Khyber Pakhtunkhwa province of Pakistan. The newly reported species are *Areotetes carinuliferus*, *Indiopius fischeri*, *Phaedrotoma biharensis*, *Phaedrotoma angiclypeata* and *Xynobius maculipennis*. New distributional data for already reported species *Dia-chasmimorpha longicaudata* are also provided. The study raises the number of species of the subfamily to 9 from Khyber Pakhtunkhwa province of Pakistan.

Received | April 25, 2021; **Accepted** | February 25, 2022; **Published** | October 05, 2022

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Citation | Sabahatullah, M. and M. Shah. 2022. New records of subfamily Opiinae (Hymenoptera: Braconidae) from Khyber Pakhtunkhwa province of Pakistan with description of a new species. *Sarhad Journal of Agriculture*, 38(4): 1430-1442.

DOI | <https://dx.doi.org/10.17582/journal.sja/2022/38.4.1430.1442>

Keywords | Braconidae, Opiinae, *Opiognathus*, New species, New records



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Introduction

Opiinae (Hymenoptera: Braconidae) is a large subfamily with 2,063 valid species in 39 genera (Yu *et al.*, 2016). It is a common group containing generally small (1.3–5.5 mm) parasitoid wasps. These wasps are koinobiont endoparasitoids of pest insects belonging to families Agromyzidae, Ephydriidae, Anthomyiidae and Tephritidae (Diptera). Hosts of only 300 species are known (Peris-Felipo *et al.*, 2014). Generally, opiine wasp species parasitize leaf mining insects and those infesting fruits and help in minimizing population of injurious insects. (Vargas *et al.*, 2007; Tobias, 1999). Due to their importance some

species of these wasps have been introduced for the suppression of pests with mixed success (Rousse *et al.*, 2005). Wharton and Marsh (1978) provided a key to the known species of Opiinae parasitizing fruit flies in the New World.

Within family Braconidae, opiine wasps can be recognized by the occipital carina which is present laterally but broadly absent dorsally. The occipital carina is rarely complete or completely absent (Tobias, 1999; Achterberg, 2004). The oral cavity may be present or absent and the second submarginal cell of the forewing is more or less narrowed distally in majority of the species (Wharton, 1997).

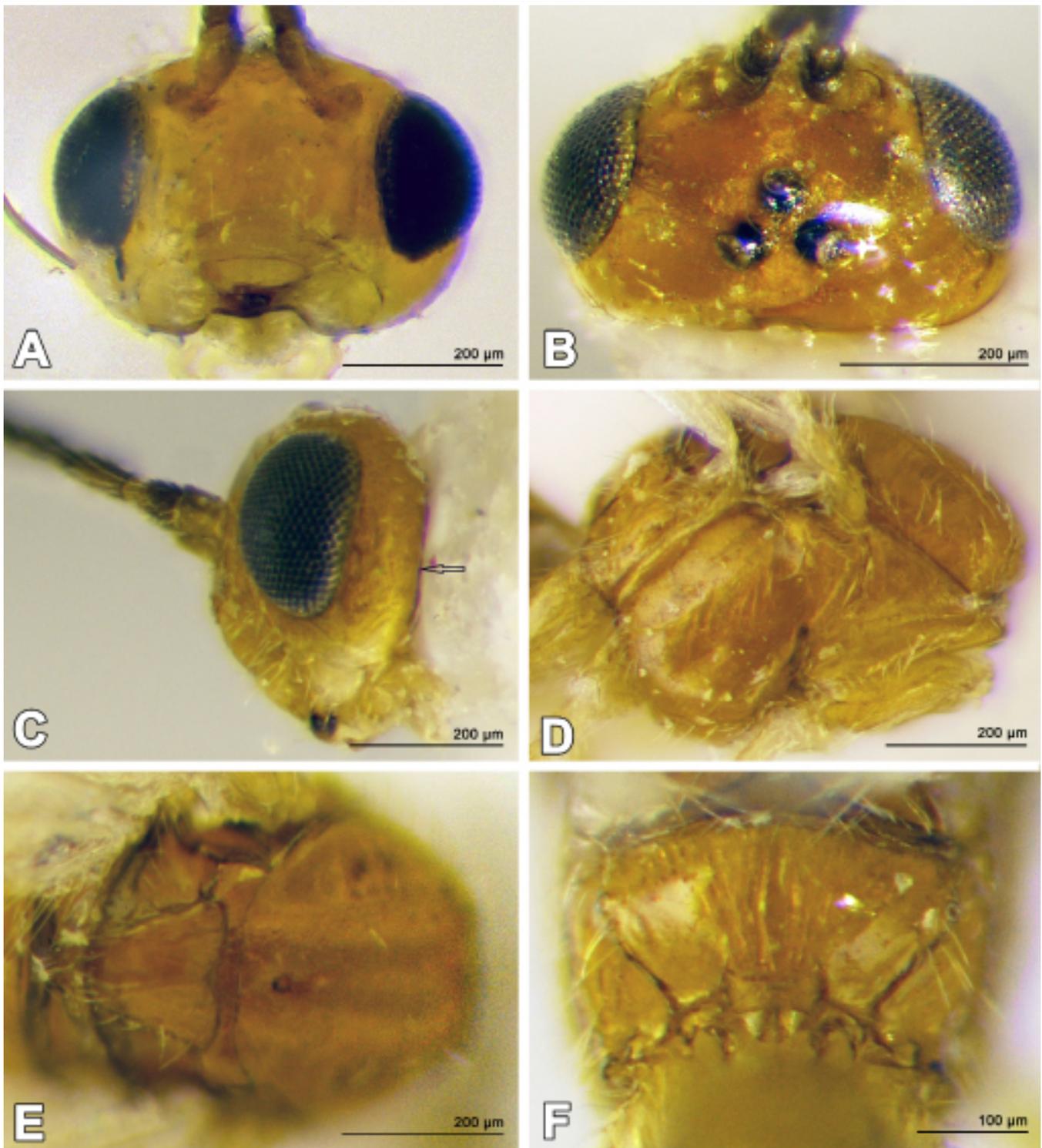


Figure 1: (*Opiognathus nitidus* sp. n.) **A:** Face, **B:** Head, **C:** Head lateral, **D:** Mesosoma lateral, **E:** Mesonotum with midpit and scutellum, **F:** Propodeum.

Irshad (2003) recorded three opiine wasps in his book on parasitoids and predators of Pakistan. Khalil *et al.* (2019) studied biodiversity of braconid wasps and recorded two opiine wasp species *viz.* *Areotetes carinuliferus* Li & Achterberg and *Opius pallipes* Wesmael from Punjab Pakistan. Chen and Weng (2005) reported one species of genus *Rhogadopsis* (no locality within Pakistan is shown). The opiine wasp fauna of Pakistan especially Khyber Pakhtunkhwa province

is poorly known. Only three species, belonging to the genera *Diachasmimorpha* and *Opius*, are reported from Khyber Pakhtunkhwa. The reason is poor sampling and lack of taxonomic knowledge on this group. Most of the work done on this group has been done by foreign explorers and biocontrol specialists in their search for natural enemies of pest insects (Irshad, 2008). No proper taxonomic studies have been conducted on Opiinae of Khyber Pakhtunkhwa province.

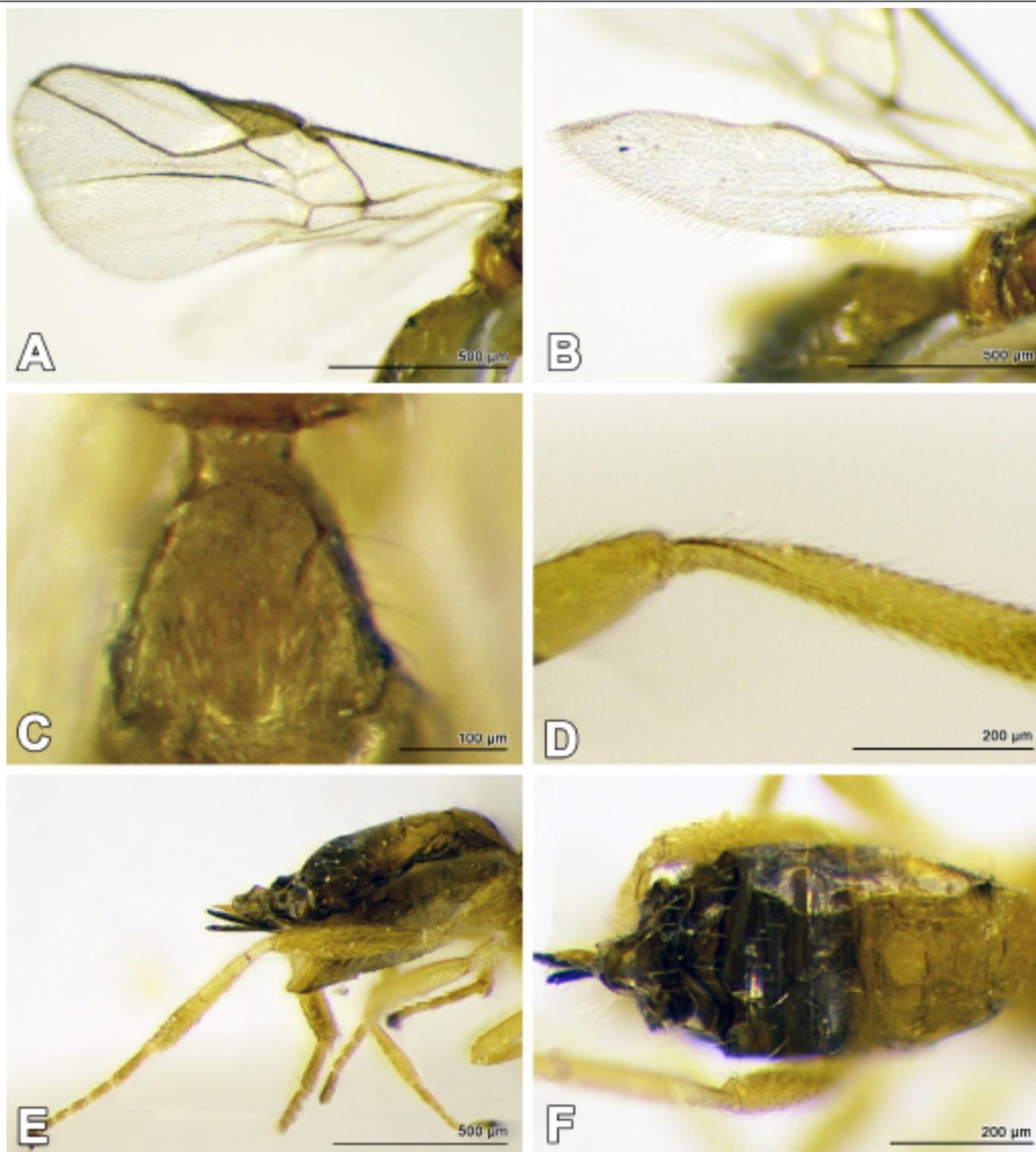


Figure 2: (*Opiognathus nitidus* sp. n.) **A:** Forewing, **B:** Hindwing, **C:** Metasomal tergum 1, **D:** Hind leg with carinula at base of tibia, **E:** Hind leg and ovipositor, **F:** Metasoma dorsal.

The present investigations deal with Opiinae fauna of Khyber Pakhtunkhwa Province which resulted in the discovery of five species from the area. Additionally, a new species is described from the investigated area.

Materials and Methods

The specimens were collected by sweep net and ma-

laise traps from different ecological zones of Khyber Pakhtunkhwa province of Pakistan. Marshy places, tall grass, fruits & vegetable gardens and crops were sampled. Specimens already housed in the entomological collection were also examined. Freshly collected specimens were directly killed and preserved in 70 percent alcohol. Critical point drying was conducted following Wharton (1997). Identification was done

with the help of reliable literature (Fischer, 1966; 1972; 1987; 2005; Li *et al.*, 2013; Chen *et al.*, 2016; Gupta *et al.*, 2019). Images and measurements were taken using Nikon 745T digital camera mounted on stereomicroscope with magnification up to 350X. For measurements and terminology, Achterberg (1993; 1997) is followed. Li *et al.* (2013) description of genera is followed for placement of species. Abbreviations T1, T2 and T3 have been used for metasomal tergum 1, 2 and 3, while F1, F2 and F3 are used for flagellomere 1, 2 and 3. SELUAP stands for Systematic Entomology Laboratory, The University of Agriculture, Peshawar where all the studied material is deposited.

Results and Discussion

Areotetes carinuliferus (Li and van Achterberg, 2013) (Figure 3C)

Areotetes carinuliferus Li *et al.*, (2013)

Material Examined: 7 females, Nathia Gali (Abbottabad), 14-15.ix.2000, leg.: Khalid. 1 male, 2 females, Swabi, 9.iv.2016, leg.: M. Sabahatullah. 5 females, 2 males, Swabi, 4.ii.2019, leg.: M. Sabahatullah. 5 females 2 males, Mardan, 5.x.2019, leg.: M. Sabahatullah. 2 males, 8 females, Swat, 12.v.2009, leg.: Inayatullah. 16 females, 2 males, Kumrat Dir, 12-15.vii.2016, leg.: Fahad Shah and Kamran. 1 male, Ayubia, 4.vii.2017, leg.: Fahad Shah. 3 females, Swat Parhlai, 5.vii. 2014, leg.: Fahad Shah and Usman. 1 female, Baragali, 26.vii.17, leg.: Fahad Shah and Usman; 1 female, Skardu, 20.vii.17, leg.: Fahad Shah and Usman; 2 males, 11 females, Swabi, 2-6.iv.2019, leg.: M. Sabahatullah. 1 female Kalam, 4.vii. 2011, leg.: Inayatullah. 2 females, 5.xi.2013, Noshehra, leg.: Inayatullah. 1 female, Charsadda, 30.10.2016, leg.: Fahad Shah. 14 females, 5 males D.I. Khan, 29.iii-2.iv.2002, leg.: Tariq. 4 females, D.I. Khan, 5.iv. 2005, leg.: Riazuddin. 3 females, Mardan, 4.ix.2011, leg.: Inayatullah. 4 females, Chitral, 26-31.vii.2002, leg.: Inayatullah. 1 male, Chitral, 6.viii. 2006, leg.: Inayatullah. 10 females, 2 males, Peshawar, 4-10.x.2008, leg.: Inayatullah. 3 females, Topi, 4.ix.2018, leg.: M. Sabahatullah. 15 females, 3 males, Kohat, 4.x.2019, leg.: M. Sabahatullah. 2 females, Chitral, 4.iii.2014, leg.: Fakhruddin. 4 females (no collection data). (SELUAP).

Diagnosis: Carinula on hind tibia and areola on propodeum distinct (Figure 3D); occipital carina present laterally, reaching almost the level of dorsal margin of compound eye and ventrally remains re-

moved from hypostomal carina, occipital carina absent dorsally. T1 convex, dorsally with lateral carinae that run posteriorly but not converging. Antenna 20-21-segmented, F1 5.1-5.2 times its maximum width. Oral cavity present, midpit absent, pronope round, sternaulus distinctly impressed and lightly crenulate; forewing vein 3-SR longer than 2-SR; ovipositor sheath 0.3 to 0.4 times the length of hind tibia. Colour of head and mesosoma varies from reddish brown to dark brown.

Distribution: In Pakistan this species is already reported from Sargodha area of Punjab province (Khalil *et al.*, 2019). *Areotetes carinuliferus* is very widely distributed species. Almost all collection efforts in all the areas yielded specimens of this species.

Outside Pakistan it has been reported from China (Li *et al.*, 2013).

Diachasmimorpha longicaudata (Ashmead, 1905)

Biosteres longicaudatus Ashmead (1905). Proc. US National Mus. 28: 290.

Material Examined: 2 males, 2 females, Kohat, 20.viii.2002 (no collector name). 4 males, 3 females, Bannu, 7.viii.2018, leg.: M. Sabahatullah. 5 males, 3 females, 4, vii.2019. (Reared in lab from *Bactrocera dorsalis* in guava from Kohat), leg.: M. Sabahatullah. 8 males, 1 female, Kohat, 6.vii.2017, leg.: M. Sabahatullah. (SELUAP).

Diagnosis: Notauli impressed, complete, smooth, reaching midpit; midpit present (Figure 3F); metasomal tergum 2 with a wide band of longitudinal carinae in the center (Figure 3E); ovipositor longer than body and sinuate apically (Figure 4A); oral cavity absent; antenna 45-55 segmented; propodeum rugose; occipital carina present laterally, absent dorsally; body color orange-yellow.

Distribution: In Pakistan this species is already recorded from many areas and reared from *Bactrocera* species (Irshad, 2005). *D. longicaudata* is also reported from India, Ceylon, West Malaysia, Thailand, Philippines, Borneo, New Guinea, Bismarck Archipelago (Fischer, 1987). For biological control of fruit pest it was introduced in southern Europe, U.S.A., Neotropics, Pacific and Australia (Wharton and Marsh, 1978).

Indiopijs fischeri (Samiuddin *et al.*, 2009)

Material Examined: 1 female, 10 km E of Peshawar,

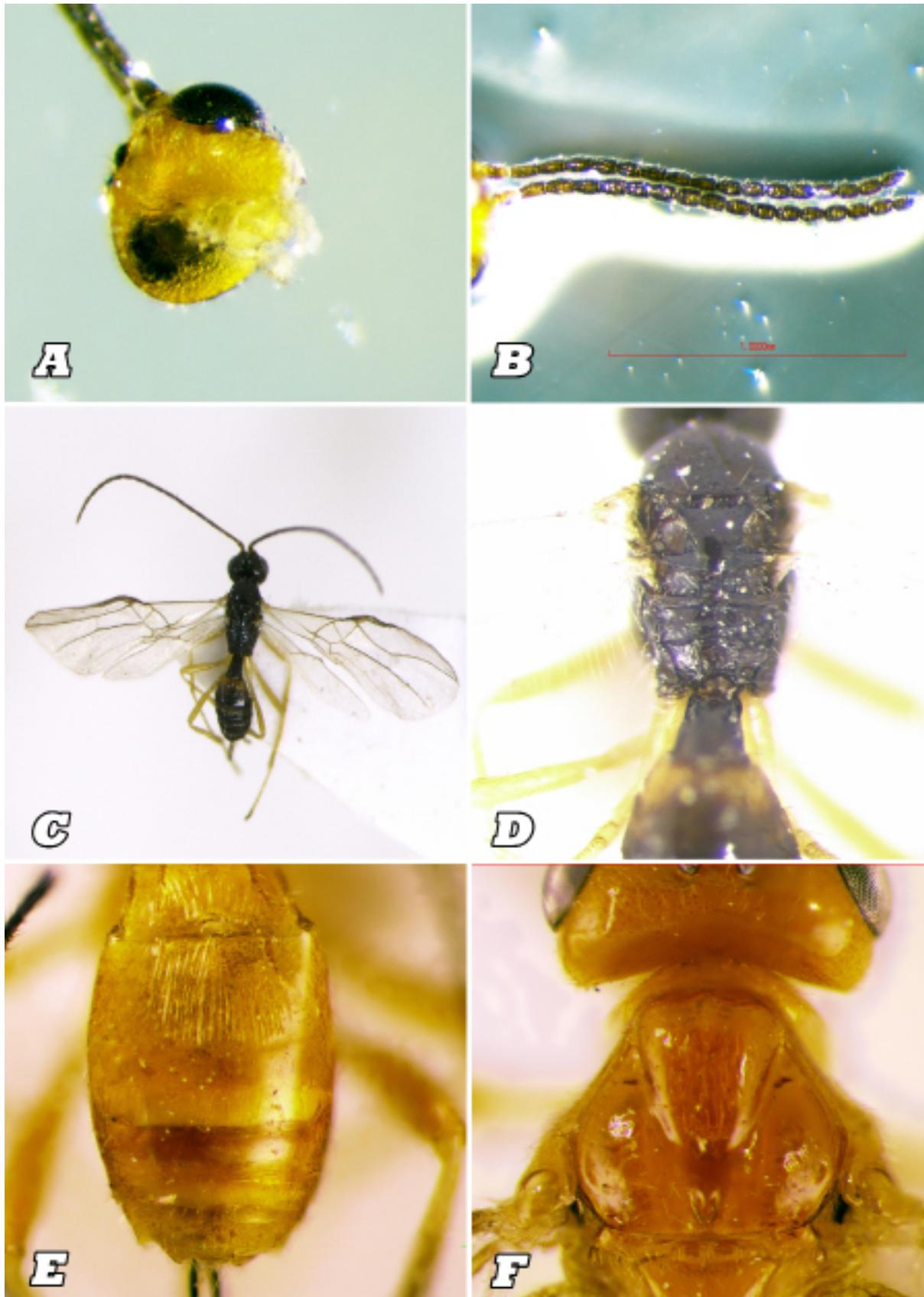


Figure 3: A: *Opiognathus nitidus* head posterior; showing no occipital carina, B: *O. nitidus*; antennae, C: *Areotetes carinuliferus*; habitus, D: *A. carinuliferus*; areolate propodeum, E: *Diachasmimorpha longicaudata*; striated T2, F: *D. longicaudata*; pronotum with midpit.

12.iv. 2017, leg.: M. Sabahatullah. 1 male (UOA), “Pakistan: Khyber Pakhtunkhwa, Peshawar, 20-vi-2014, leg.: M. Sabahatullah (SELUAP). 1 female, Lakki, 18.ix.2019, leg.: M. Sabahatullah. (SELUAP).
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Diagnosis: Occipital carina entirely absent, vertex and occiput completely smooth and polished; face and frons smooth and shiny (Figure 4D); antenna 18 segmented (Male 19 segments) (Figure 4); clypeus

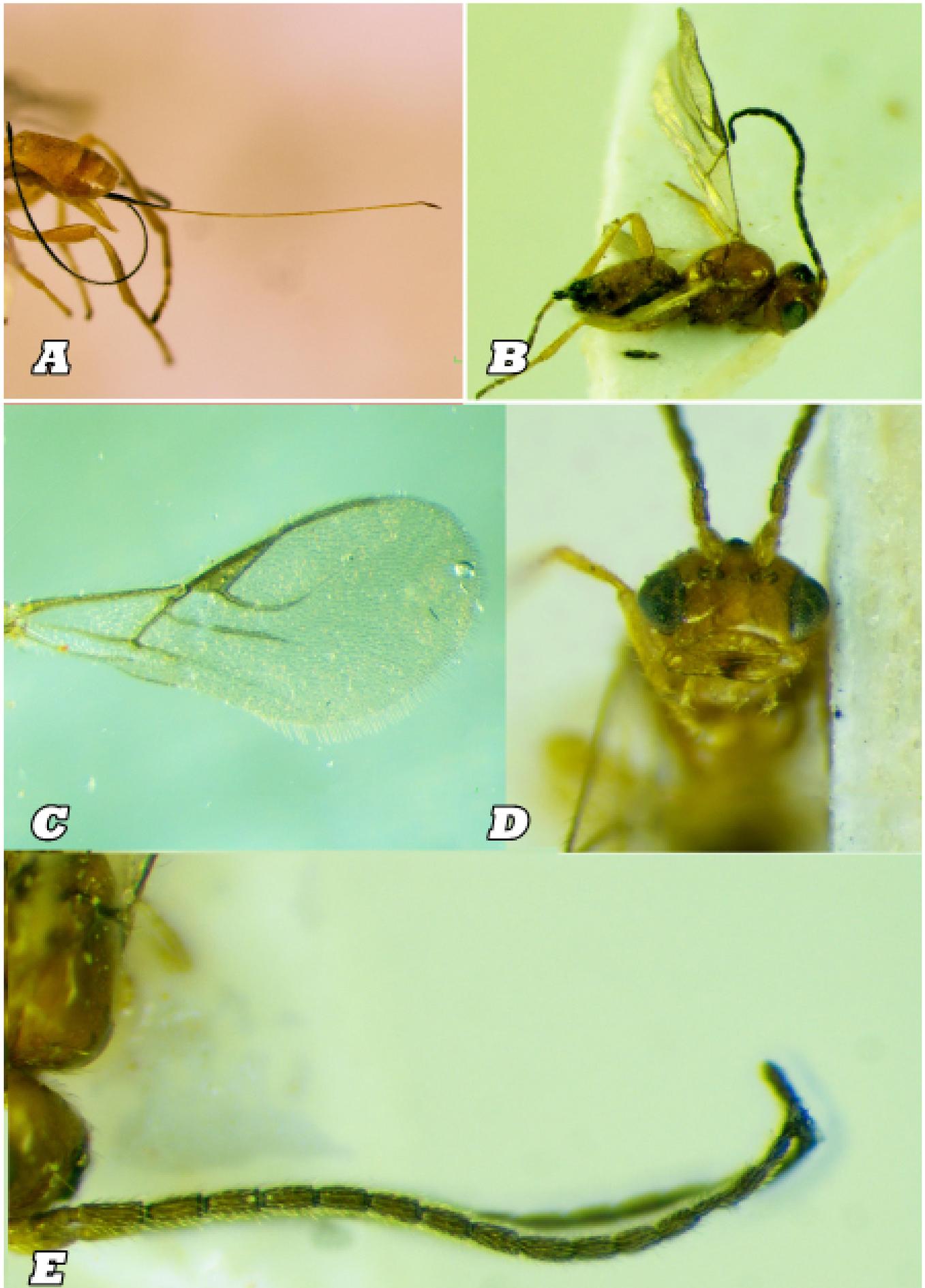


Figure 4: A: *D. longicaudata*; ovipositor, B: *Indiopus fischeri*; habitus, C: *I. fischeri*; forewing, D: *I. fischeri*; face, E: *I. fischeri*; antennae.

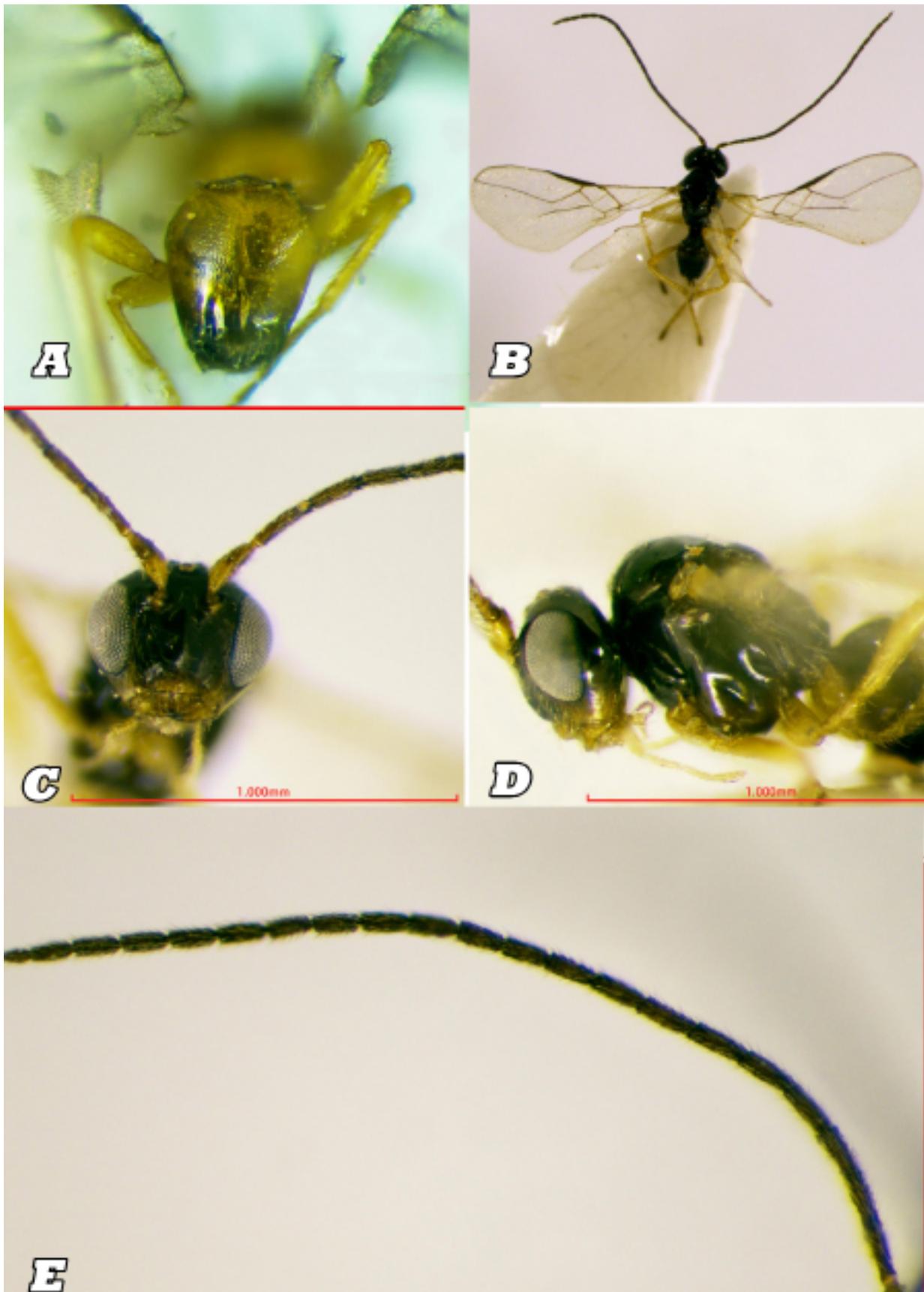


Figure 5: A: *I. fischeri*; granulated abdomen, B: *Phaedrotoma angiclypeata*; habitus, C: *P. angiclypeata*; face, D: *P. angiclypeata*; head and mesosoma lateral view, E: *P. angiclypeata*; antennae.

3.4- 3.8 times wider than long; hind femur 3.3-3.6 times longer than wide; ovipositor sheath shorter than T1; T2-T4 distinctly granulate (Figure 5A).

Distribution: The species was collected in from Swabi, Lakki and Peshawar areas of Khyber Pakhtunkhwa in Pakistan.

Outside Pakistan it was reported from Uttar Pradesh (India) (Samiuddin *et al.*, 2009).

Phaedrotoma angicypeata (Li and van Achterberg, 2013)

Material examined: 1 Female, Swat, 8-12. Vii. 2018, leg.: M. Sabahatullah. 3 females, Mingora, Swat, 4.vii.2017, leg.: S. F. Shah and M. Usman. 1 female, Abbottabad, 5.ix.2017, leg.: M. Sabahatullah. 1 female, Upper Junki (Dir), 12.vii.2016, leg.: S. F. Shah and M. Usman. 1 male, Kumrat, Dir, 10.vii.20016, leg.: S. F. Shah and M. Usman. 2 males Malamjaba (Swat), 15.vi.2018, leg.: M. Sabahatullah. 1 female, Malamjaba, 4.ix.2018, leg.: M. Sabahatullah. 1 female, Malamjaba (Swat), 28.vii.2003, leg.: Inayatullah. 1 female, Kalkot, 24.vii.2007, leg.: Usman and Kamran. (SELUAP).

Diagnosis: F1 5.00 times its maximum width; antenna with 22-26 segments (Figure 5 C and E); malar suture absent, epistomal suture present; oral cavity present (Figure 5C); length of mesosoma equals its height; scutellar sulcus deep and crenulate; sternaulus present, shallow and smooth (Figure 5D); propodeum smooth and shiny with a short longitudinal carina posteriorly; T1 1.2 times its apical width with longitudinal carinae (Figure 6A); ovipositor sheath half as long as T1.

Distribution: *Phaedrotoma angicypeata* is restricted to northern hilly areas of Khyber Pakhtunkhwa including Malam Jabba (Swat), Kalkot (Dir) and Abbottabad.

Outside Pakistan it is found in China (Li *et al.*, 2013).

Phaedrotoma biharensis (Samiuddin and Ahmad, 2009)

Opius (Gastrosema) biharensis Samiuddin *et al.*, (2009)

Material examined: 1 female, Noshehra, 15.v.2017, leg.: M. Sabahatullah. 1 female Swabi, 5.iv.2017, leg.: M. Sabahatullah, 1 male, Swabi, 20.viii. 2002, leg.: Inayatullah. 1 female, Swabi, 5.viii.2006, leg.: Inayatullah. 1 male, Swabi, 4.v.2018, leg.: M. Sabahatullah. 1 female, Swabi, 12.iv.2002, leg.: Inayatullah, 5 males, 1 female, Wanna. 28.ix.2018, leg.: M. Sabahatullah, 1 female, Malamjaba, 6-.vi.2005, leg.: Inayatullah. 1 female, Lakki, 15.ix.2018, leg.: M. Sabahatullah. 1 male Mingora Swat, 5.x.2014, leg.: Inayatullah, 1 female D.I.Khan, 5.iii.2002, leg.: Riaz. 1 female, Chatral, 5.ix.2015, leg.: Fakhruddin. 15 males, 5 females, Lakki, 18.ix.2018, leg.: M. Sabahatullah, 3 males, 5 females, Mardan. 4.v.2017, leg.: M. Sabahatullah. (SELUAP).

Diagnosis: Sternaulus deeply impressed and crenulate (Figure 6D); propodeum strongly granulate to vermiculate-rugose (Figure 6E); SR-1 3.3 times as long as 3-SR; T1 1.1 -1.2 times as long as apical width (Figure 6C); antenna 24- 26 segmented; T2 lightly granulate, T3-4 distinctly longitudinally granulate.

Distribution: The species is widely distributed in different areas of the province including agro-ecological zones including central valley plains (Swabi, Mardan, Peshawar), piedmont plains (D. I. Khan) and northern mountains (Swat and Chatral). Outside Pakistan it has been reported from India (Samiuddin *et al.*, 2009).

Xynobius maculipennis (Enderlein, 1912)

(Figure 6, F)

Opius maculipennis (Enderlein, 1912)

Material examined: 1 male, "Pakistan: Khyber Pakhtunkhwa, Dera Ismail Khan, 08-15.viii.2018, leg.: M. Sabahatullah. (SELUAP).

Diagnosis: Male. Face 1.8 times height (Figure 7A); forewing with conspicuous dark brown patch right below pterostigma reaching first subdiscal cell (Figure 7B). Dorsople distinct on T1; Notauli deep anteriorly, shallow posteriorly; sternaulus crenulate; mesosoma with dense silky setae; scutellum strongly convex; colour predominantly black; midpit present, elongate; hind tibia brown and with pale yellowish patch basally; antennae 36 segmented.

Distribution: Based on our sampling *Xynobius maculipennis* (Enderlein) is rare species occurring only in Dera Ismail Khan. Outside Pakistan it has been reported from India (Fischer, 1966) and China (Li *et al.*, 2013).

Opiognathus nitidus Sabahatullah & Shah *sp. nov.*

Material Examined: Holotype : Female, Bannu (32.991519°N, 70.562603°E) 12.vi.2018, collected by M. Sabahatullah.

Diagnosis: Occipital carina completely absent (Figure 1C); hind tibia basally with a distinct longitudinal carinula (Figure 2D); mandible expanded basally, abruptly narrowed distally (Figure 1A); pronope absent; midpit present (Figure 1E); oral cavity present; sternaulus impressed, smooth as rest of mesopleuron; notauli absent on disc; face and propodeum smooth; antenna 18 segmented, shorter than body (Figure 3B); ovipositor sheath shorter than T1 (Figure 2E).

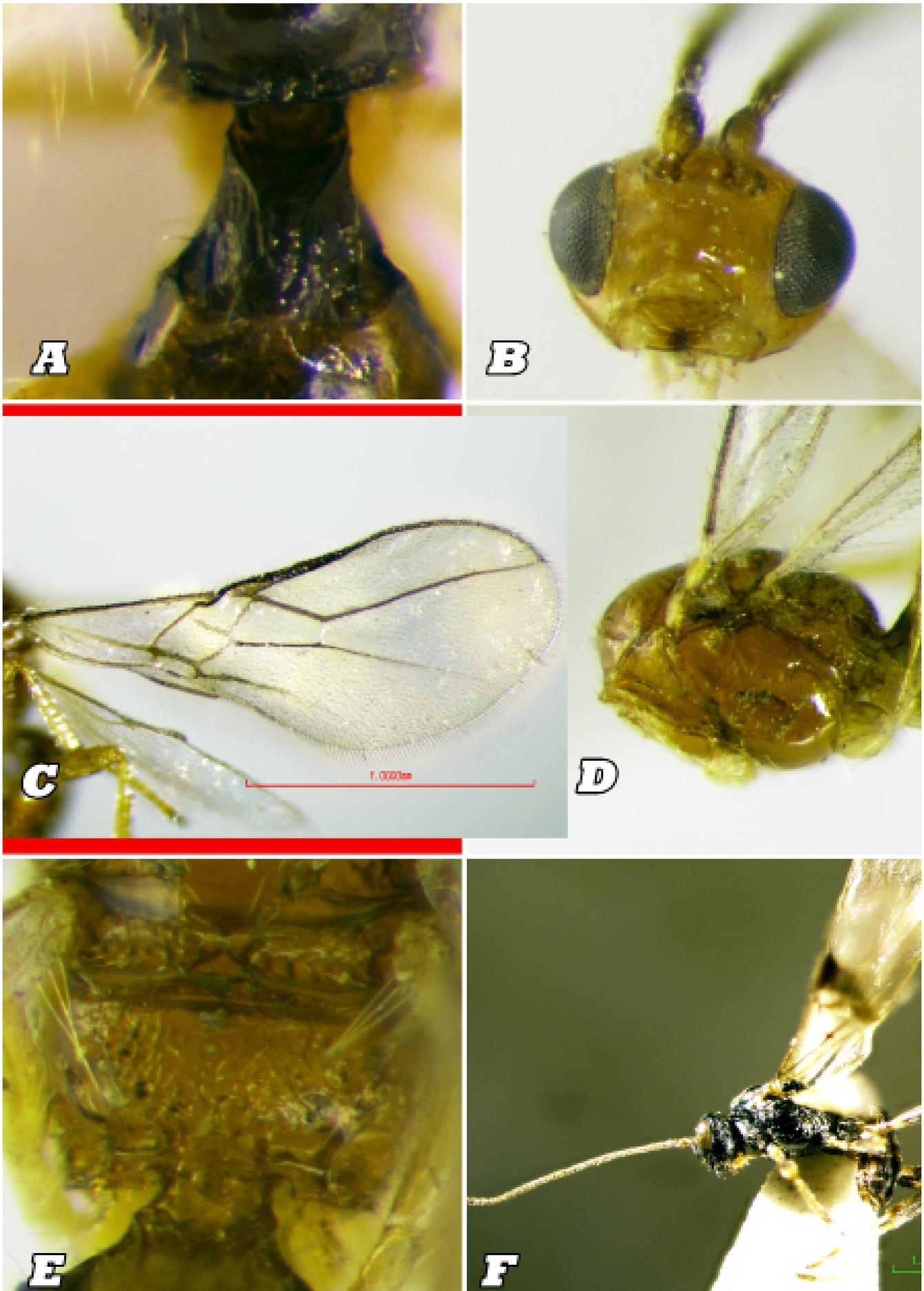


Figure 6: A: *P. angiclypeata*; metasomal tergum 1, B: *Phaedrotoma biharensis*; Face, C: *P. biharensis*; forewing, D: *P. biharensis*; mesosoma lateral, E: *P. biharensis*; propodeum, F: *Xynobius maculipennis*; habitus.

Description of Holotype Female: length of body 1.68 mm, of fore wing 1.7 mm, antenna length 1.47 mm; OD: POL: OOL = 1:2.37:2.4.

Head: Antenna with 18 segments, 0.78 times as long as forewing; length of third antennal segment 1.14 times fourth segment and 1.2 times fifth segment, length of scape, pedicel, F1, F2, F3 and penultimate segment 1.46, 1.35, 2.85, 2.28, 1.9 and 2.96 times their width respectively, 5 longitudinal placods visible in lateral view (Figure 3A); compound eyes 1.5 times as long as wide (Figure 1C) and twice the height of temple in dorsal view (Figure 1B); face smooth, transverse, twice wider than long. Maxillary palpus equals in length to head height; basal mandibular height 2.83 times malar space. Occipital carina absent both laterally and dorsally (Figure 3A). Hypostomal carina distinct. Clypeus wide, smooth and shiny, 4.6 times wider than high; epistomal suture weakly developed, oral cavity present. Anterior tentorial pits weakly indicated. Mandibles abruptly narrowed at distal half with a carina basally, mandibular surface smooth; malar suture indistinct, frons smooth and shiny (Figure 1A); area behind antennae depressed. Vertex and temple smooth and roundly narrowed behind compound eyes and stemmaticum.

Mesosoma: Length of mesosoma 1.3 times its maximum height (Figure 1D); pronope absent, pronotum smooth in lateral view; anterior groove smooth, with some weak crenulation ventrally. Mesoscutum flat; notauli absent on disc only anteriorly faintly indicated; midpit present, round and deep (Figure 1E). Scutellar sulcus wide and crenulate; scutellum weakly convex, side field smooth. Mesopleuron smooth and shiny. Episternal scrobe absent; posterior groove of mesopleuron distinct and smooth, Sternaulus weakly impressed; metapleuron smooth with some superficial indistinct dorsal rugosity; propodeum smooth and shiny (Figure 1F).

Wings: Forewing (Figure 2A) 2.2 times maximum width, 1.1 time antennae and about as long as body length. r: 3-SR: SR-1= 1: 8: 17, r: 2-SR: m-cu= 1: 7.3: 2.7; Stigma discrete & triangular; length 3.9 times its maximum width and 0.9 times 1R1; m-cu of forewing postfurcal; cu-a interstitial; m-cu linear with vein 2-M; SR-1 reaching wing tip; first subdiscal cell almost closed; Vein CU1a pigmented for the most part. Length of hind wing 0.72 times forewing and 5 times its own width. M+CU: 1M: r-m = 1.88: 2.22:1 (Figure 1B).

Legs: Carinula present on inner side of hind tibia (Figure 2D). All tibiae gradually broadening distally. Hind femur 4 times its maximum width. Hind tibia 7.33 times as long as its maximum width. Hind femur: hind tarsus: hind tarsi= 1: 1.27: 1.35 (Figure 2E).

Metasoma: T1 (Figure 2C) about as long as wide and almost smooth at anterior half, broadening posteriorly, dorsal carinae present running posteriorly, not converging. Longitudinal carina present. T2 and T3 smooth and shining. The following segment weakly smooth. Ovipositor sheath 0.2 mm; hypopygium triangular and pointed (Figure 2 E and F).

Color: Predominantly light orange yellow, mandibular tip and antennae dark brown. Legs light yellow, metasoma t1 to t3 brownish yellow. The following segments brown telotarsi brown. Stigma and veins dark brown, wings hyaline.

Male: Unknown.

Hosts: Unknown

Distribution: Only known from the type locality (Bannu).

Repository: Holotype is deposited in the SELUAP.

Comments:

Opiognathus nitidus sp. nova is closely related to *Opiognathus brevibasalis* Li & Achterberg. In both species the propleuron is flattened, T1 and propodeum are largely smooth, mandible are abruptly widened basally, notauli are absent on disc, pleural sulcus is smooth, smooth and shining mesoscutum and ovipositor is short. *Opiognathus nitidus* sp. nova differs from *O. brevibasalis* by the presence of midpit and oral cavity (absent in *O. brevibasalis*), sternaulus weakly impressed and smooth as rest of mesopleuron (finely crenulate), antenna 18 segmented, segments roughly bead-like (antenna 24 segmented, segments cylindrical).

Due to the presence of carinula on hind tibia *Opiognathus nitidus* sp. nova will easily run to genus *Opiognathus* in Li *et al.* (2013) key for Chinese species. The species is unique in the genus due to the absence of occipital carina. Fischer (1972) erected a new tribe Desmiostomini for Opiinae species lacking the occipital carina. However according to Wharton (1987; 1988) and Wharton and Marsh (1978) the relative development of occipital carina is characteristic of a species or subgenera and not useful at tribal or generic level.

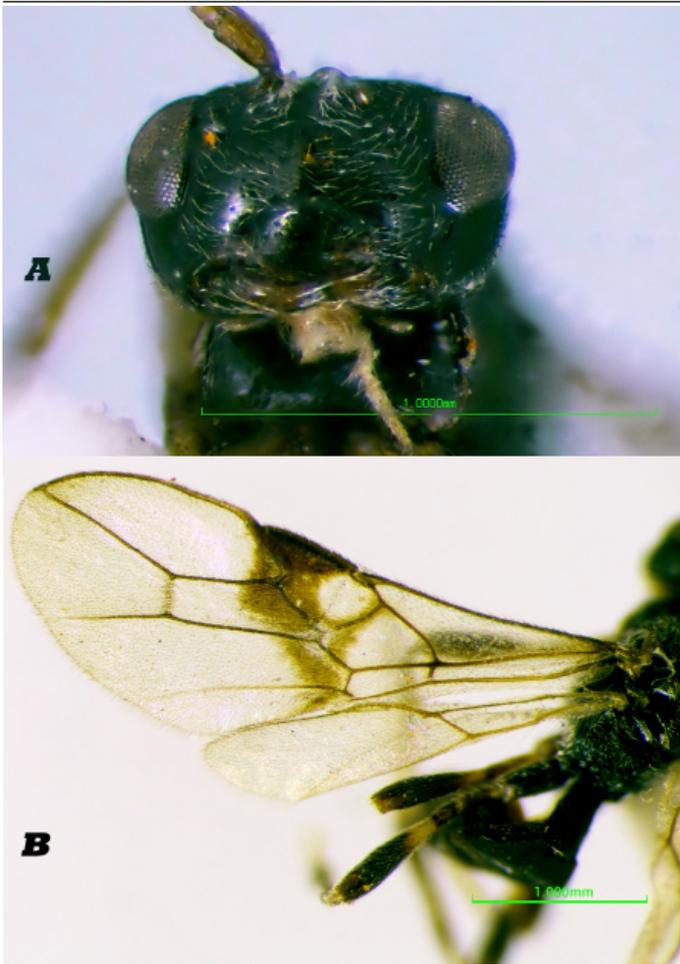


Figure 7: A: *X. maculipennis*; face, B: *X. maculipennis*; forewing and hindwing.

Taxonomists all over the world have studied the taxonomy, biology and bio-control potential of opiine wasps. So far 2063 species under 39 genera have been described (Yu *et al.*, 2016). The opiine fauna of Pakistan contains only five species (Irshad, 2005; Chen and Weng, 2005; Khalil *et al.*, 2019). Before this study three species were recorded in Khyber Pakhtunkhwa province (Irshad, 2005). In the present study six species, including a new species, were discovered thus raising the number of species to 11 from Pakistan and nine in the investigated area.

During the present investigations Genus *Areotetes* Achterberg & Li is reported for the first time from the province. *Areotetes* is a small genus containing two species worldwide (Li *et al.*, 2013) out of which *A. carinuliferus*, an already reported species from Punjab Province (Khalil *et al.*, 2019), was discovered in Khyber Pakhtunkhwa province. The other species of the genus occurs in China (Li *et al.*, 2013).

Genus *Diachasmimorpha* Ashmead is a moderately diverse group containing 69 species worldwide (Yu *et*

al., 2016). Achterberg (1999) has listed seven species in Palaearctic region. In Pakistan only one species, *D. longicaudata* (Ashmead), occurs which is already reported from many areas of Pakistan. In the present studies it was for the first time discovered in guava growing area of Kohat. The species is associated with tephritids fruit pests and has been extensively used as bio-control agent for tephritids fruit pests (Rousse *et al.*, 2005; Wharton and Marsh, 1978).

Genus *Indiopi* is also reported for the first time from Pakistan. The genus contains eight species worldwide. Out of these, three species occur in the Oriental region including two from India (Peris Felipe *et al.*, 2014). *Indiopi fischeri* Samiuddin & Ahmad was recorded from the investigated territory which is a new record for Pakistan.

Genus *Phaedrotoma* Foerster is one of the most diverse groups of opiine wasps containing 120 species (Yu *et al.*, 2016). The genus has worldwide distribution and is newly recorded in Khyber Pakhtunkhwa Province. Fischer (1973; 1987) considers it as a subgenus of *Opius* Wesm. After conducting molecular studies on Opiinae of China Li *et al.* (2013) have placed many genera, subgenera in synonymy under Genus *Phaedrotoma*. This may significantly increase the number of *Phaedrotoma* species when the species under the synonymized genera are transferred to genus *Phaedrotoma*. The limits of the genus are still debated and Li *et al.* (2013) consider it as a 'dustbin' genus where species with no derived character states are placed. In the present study two species have been discovered as first reports from the investigated area *viz.* *Phaedrotoma angiclypeata* Li & Achterberg and *Phaedrotoma biharensis* (Samiuddin & Ahmad) compared to five species from the neighboring India under subgenus *Phaedrotoma*. The former species is restricted to northern hilly areas of the province, while the later is widely distributed in the plane and hilly areas of the province. *Phaedrotoma biharensis* was described as *Opius (Gastrosema) biharensis* by Samiuddin *et al.* (2009). Li *et al.* (2013) placed *Gastrosema* as synonym of *Phaedrotoma*. We are therefore proposing the new combination as *Phaedrotoma biharensis* (Samiuddin & Ahmad).

Xynobius maculipennis (Enderlin) is a newly recorded species from the investigated territory. So far 96 species of *Xynobius* have been reported worldwide (Yu *et al.*, 2016). Wharton (1988) recognizes *Xynobius* Fo-

erster as synonym of genus *Opius* Wesmael but it has dorsope on T1 and normal mandibles (Achterberg, 2004), we therefore prefer to recognize it as valid genus. *Xynobius* species are parasitoids of leaf mining Anthomyiidae and Scatophagidae (Diptera) (Achterberg, 2004).

Genus *Opiognathus* was recorded with a new species *Opiognathus nitidus* sp. nova. The new species has carinula on hind tibia similar to that of *Utetes* Forster and *Areotetes* van Achterberg & Li species but the combination of the presence of oral cavity, basally abruptly broadened mandible and the smooth face and propodeum makes it *Opiognathus* species. The new species is distinct from other *Opiognathus* species by the absence of occipital carina.

Conclusions and Recommendations

The Opiinae fauna of Khyber Pakhtunkhwa province need to be further explored for opiine species as these parasitoids are important in the natural and biological control of dipterous pests. Rearing of dipterous pests, especially those infesting fruits and vegetables should be done to ascertain the hosts of these species.

Acknowledgments

The authors are grateful to the Higher Education Commission of Pakistan for providing funds for this research and The Chairman, Department of Entomology for providing necessary facilities for studying the specimens.

Novelty Statement

Five species including a new species have been added to the Opiinae fauna of Khyber Pakhtunkhwa province of Pakistan raising the number of opiine species to 9 from the area. New distributional records are provided for the recorded species. Additionally, a new species is described.

Author's Contribution

Mian Sabahatullah: Collection, preservation and identification of the specimens by studying the available literature on the group. Correspondence with international experts on the nomination and confirmation of the new species and already discovered species respectively.

Maqsood Shah: Provision of literature and guidance in identification of the specimens, also provided practical training on the calibration of the Nikon smz745T microscope for measurements of the characters of taxonomic importance.

Conflict of interest

The authors have declared no conflict of interest.

References

- Ashmead, W.H. 1905. Additions to the recorded Hymenopterous fauna of the Philippine Islands, with descriptions of new species. Proc. U.S. nation. Mus., Washington, 28: 957-97. <https://doi.org/10.5479/si.00963801.28-1413.957>
- Chen, J.H. and R.Q. Weng. 2005. Systematic studies on Opiinae of China (Hymenoptera: Braconidae). Fujian Sci. Technol. Publish. House, Fujian, pp. 269.
- Chen, M., C. Van Achterberg, J.L. Tan, Q.G. Tan and X.X. Chen. 2016. Four new species of *Rhogadopsis* Brèthes from NW China (Hymenoptera, Braconidae, Opiinae). J. Hymenopt. Res., 52:37-60. <https://doi.org/10.3897/jhr.52.9806>
- Enderlein, G. 1912. H. Sauter's Formosa-Ausbeute. Braconidae, Proctotrupidae und Euanthidae (Hym.). Ent. Mitt., Berlin, 1: 257-267. <https://doi.org/10.5962/bhl.part.25902>
- Fischer, M. 1966. Revision der indo-australischen Opiinae (Hymenoptera, Braconidae), Den Haag, 167 pp. <https://doi.org/10.1007/978-94-017-6018-8>
- Fischer, M. 1972. Hymenoptera Braconidae (Opiinae 1). (Paläarktische Region). Das Tierreich, 91: 1-620.
- Fischer, M. 1987. Hymenoptera, Opiinae III: Athiopische, orientalische, australische und ozeanische region. Das Tierreich., 104. Verlag Walter de Gruyter Berlin, New York, 734pp. <https://doi.org/10.1515/9783110744965>
- Fischer, M. 2005. Some new Opiinae (Insecta: Hymenoptera: Braconidae) in the Natural History Museum Vienna. Ann. Naturhist. Mus. Wien, 106B: 107-133.
- Gupta, A., C. van Achterberg and R.B. Chandish. 2019. Two new species of *Rhogadopsis* Brèthes (Braconidae: Opiinae) as solitary parasitoids of *Meroclorops* species complex (Diptera: Chloropidae) from India. Zootaxa, 4550(2): 268-276.

- <https://doi.org/10.11646/zootaxa.4550.2.7>
- Irshad, M. 2003. Parasitoids, predators & pathogens of Agriculture and Forest insect Pests of Pakistan. National IPM Programme, NARC, Islamabad, Pakistan. 1-78. pp.
- Irshad, M. 2008. Biological Control of Insects and Weeds in Pakistan. Higher Education Commission of Pakistan, 319 pp.
- Khalil, H., M. Afzal, M.A. Aqueel, A.M. Raza, M.S. Khalil, F. Khalil and H.K. Shurjeel. 2019. Seasonal biodiversity of Braconidae (Hymenoptera) in citrus orchards of Sargodha, Pakistan Sarhad J. Agric., 35(2):476-490. <https://doi.org/10.17582/journal.sja/2019/35.2.476.490>
- Li, X.Y., C. van Achterberg and J.C. Tan. 2013. Revision of the subfamily Opiinae (Hymenoptera, Braconidae) from Hunan (China), including thirty-six new species and two new genera. ZooKeys, 268: 1-168.
- Peris-Felipo, F.J., Z. Rahmani, S.A. Belokobylskij and E. Rakhshani. 2014. Genus *Indiopijs* Fischer, 1966 (Hymenoptera, Braconidae, Opiinae) in Iran with a key to the world species. ZooKeys, 368: 37-44. <https://doi.org/10.3897/zookeys.368.6658>
- Rousse, P., E.J. Harris and S. Quilici. 2005. *Fopius arisanus*, an egg-pupal parasitoid of Tephritidae. Overview. BioControl News Info., 26(2): 59-69.
- Samiuddin, A., Z. Ahmad and M. Shamim. 2009. Description of new species of genus *Indiopijs* Fischer (Hymenoptera: Braconidae) from India. J. Threat. Taxa, 1(12):619-20. <https://doi.org/10.11609/JoTT.o1947.619-20>
- Tobias, V.I. 1999. Subfamily Opiinae. pp: 1-156. In: Medvedev (Ed.) Keys to the Insect of the European Part of the USSR. Vol. 3 Part 5. (English translation). Science Publishers New York.
- van Achterberg C. 1993. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). Zool. Verh. Lei., 283: 1-189.
- van Achterberg, C. 1997. Revision of the Haliday collection of Braconidae (Hymenoptera). Zool. Verh. Lei., 314, 1-115.
- van Achterberg, C. 1999. The Palaearctic species of the genus *Diachasmimorpha* Viereck (Hymenoptera: Braconidae: Opiinae). Zool. Verh. Lei., 73 (1):1-10.
- van Achterberg, C. 2004. New Indo-Australian subgenera and species of the genera *Xynobius* Foerster and *Ademoneuron* Fischer (Hymenoptera: Braconidae: Opiinae). Zool. Verh. Lei., 78 (20): 313-329.
- Vargas, R.I., Leblanc, L., Putoa, R. and Eitam, E. 2007. Impact of introduction of *Bactrocera dorsalis* (Diptera: Tephritidae) and classical biological control releases of *Fopius arisanus* (Hymenoptera: Braconidae) on economically important fruit flies in French Polynesia. J. Econ. Entomol., 100(3): 670-679. [https://doi.org/10.1603/0022-0493\(2007\)100\[670:IOIOBD\]2.0.CO;2](https://doi.org/10.1603/0022-0493(2007)100[670:IOIOBD]2.0.CO;2)
- Wharton, R.A and P.M. Marsh. 1978. New World Opiinae (Hymenoptera: Braconidae) Parasitic on Tephritidae (Diptera). J. Wash. Acad. Sci., 68 (4):147-167.
- Wharton, R.A. 1987. Changes in nomenclature and classification of some Opiine Braconidae (Hymenoptera). Proc. Entomol. Soc. Wash., 89 (1): 61-73.
- Wharton, R.A. 1997. Subfamily Opiinae, pp. 378-39. In: Wharton, R.A., P.M. Marsh and M.J. Sharkey (Eds.). Manual of the New World Genera of the Family Braconidae (Hymenoptera). International Society of Hymenopterists Special Publication No. 1. 439 pp.
- Wharton, R.A. 1988. Classification of the braconid subfamily Opiinae (Hymenoptera). Can. Entomol., 120: 333-360. <https://doi.org/10.4039/Ent120333-4>
- Yu, D.S., C. van Achterberg and K. Horstmann. 2016. Taxapad, Ichneumonoidea, 2016. Database.